What is claimed is:

1. The process for growing single crystals, wherein crystal material is melted in a crucible and a crystal nucleus is immersed in the molten crystal material and slowly pulled out, wherein the crystal formed during the pulling is kept at a temperature close to melting temperature of the output material.

2. The process of claim 1 wherein the formed crystal is kept at a temperature close to the melting temperature by at least one of: shielding the crystal material, pulled out of the melt and solidified, from heat-radiation and conductivity losses and at least partly offsetting heat losses by additional heating.

3. The process according to claim 1, wherein during the slow pulling-out of the crystal nucleus, a low temperature gradient is set between molten crystal material and the single crystal pulled out of the melt.

4. The process according to claim 2, wherein during the slow pulling-out of the crystal nucleus, a low temperature gradient is set between molten crystal material and the single crystal pulled out of the melt.

5. The process according to claim 2, wherein shielding and additional heating are arranged in such a way that an essentially constant temperature gradient is set in the pulling direction of the crystal.

6. The process according to claim 1, wherein the temperature gradient in the solidified crystal material is kept below a maximum value of 4°K/cm during the pulling.

7. The process according to claim 2, wherein the temperature gradient in the solidified crystal material is kept below a maximum value of 4°K/cm during the pulling.

8. The process according to claim 2, wherein after the pulling of the crystal, the maximum temperature gradient inside the crystal is set to a value below 3°K/cm and the whole crystal is cooled down evenly.

9. The process according to claim 1, wherein the crucible, at least while the crystal is slowly pulled out, is arranged in a tube made from electrically conductive material, which serves as a susceptor, and the tube is heated inductively.

10. The process according to claim 2, wherein the crucible, at least while the crystal is slowly pulled out, is arranged in a tube made from electrically conductive material, which serves as a susceptor, and the tube is heated inductively.

11. The process according to claim 1, wherein at least the slow pulling-out takes place under vacuum, i.e. preferably under a pressure of between 10^{-2} and 10^{-8} hectopascals.

12. The process according to claim 2, wherein at least the slow pulling-out takes place under vacuum.

13. The process of claim 12, wherein the slow pulling-out takes place at a pressure of between 10^{-2} and 10^{-8} hectopascals.

14. The process according to claim 1, wherein at least the slow pulling-out takes place in a growing atmosphere selected from the group consisting of argon; nitrogen; a mixture of argon and oxygen, the oxygen proportion preferably being between 0 and 2 vol.-%; a mixture of nitrogen and oxygen, the oxygen proportion preferably being between 0 and 2 vol.-%; and a mixture of argon and hydrogen, the hydrogen proportion preferably being between 0 and 10 vol.-%.

15. The process according to claim 2, wherein at least the slow pulling-out takes place in a growing atmosphere selected from the group consisting of argon; nitrogen; a mixture of argon and oxygen, the oxygen proportion preferably being between 0 and 2 vol.-%; a mixture of nitrogen and oxygen, the oxygen proportion preferably being between 0 and 2 vol.-%; and a mixture of argon and hydrogen, the hydrogen proportion preferably being between 0 and 10 vol.-%.

16. The process according to claim 1, wherein the temperature in the environment of the crucible is controlled.

17. The process according to claim 2, wherein the temperature in the environment of the crucible is controlled.

18. The process according to claim 16, wherein the temperature in the environment of the crucible is controlled by suitable choice of the inductor dimension and the susceptor geometry.

19. The process according to claim 1, wherein the temperature gradient along the single crystal grown is controlled or regulated between molten crystal material and the crystal nucleus.

20. The process according to claim 19, wherein the setting of the temperature gradient takes place by means of the inductor dimension and the susceptor geometry.

21. The process according to claim 9, wherein susceptor material is selected depending on crucible material and growing atmosphere.

22. The process according to claim 1, wherein a non-metal crystal nucleus is used.

23. The process according to claim 1, wherein a corundum crystal nucleus (Al_2O_3) is used.

24. The process according to claim 2, wherein a corundum crystal nucleus (Al_2O_3) is used.

25. The process according to claim 1, wherein the crystal nucleus is immersed in the crystal material and slowly pulled out in approximately the direction of the crystallographic c-axis with a deviation of less than $\pm 15°$.

26. A device for growing single crystals having a crucible to receive molten crystal material, a heating device for heating the crucible and the crystal material and a device for pulling the crystal out of the melt using an immersed crystal nucleus wherein at least one of a shield and heating element is provided surrounding the crystal during the pulling which prevents rapid cooling of the solidified crystal material in comparison with the melt and a large temperature gradient within solidified crystal material.

27. A device according to claim 26, wherein the heating device consists of a susceptor tube made from electrically conductive material inside of which the crucible is arranged, and an inductor which heats the tube inductively.

28. A device according to claim 27, wherein the tube consists of graphite, tungsten, molybdenum, iridium, rhenium, tantalum, osmium, or an allow of the above-mentioned elements.

29. A device according to claim 27, wherein susceptor length is adjustable.

30. A device according to claim 27, wherein the position of the inductor is adjustable.

31. A device according to claim 26, wherein the crucible consists of iridium, molybdenum, tungsten, rhenium, tantalum, osmium, or an alloy of the above-mentioned elements.

32. A device according to claim 27, wherein the crucible consists of iridium, molybdenum, tungsten, rhenium, tantalum, osmium, or an alloy of the above-mentioned elements.